DOCUMENT RESUME

ED 236 876 EC 160 897

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TITLE Language Level as a Mediator of Learning from Television.
PUB DATE Apr 83
NOTE 18p.; Paper presented at the Annual Meeting of the Eastern Communication Association (Ocean City, MD, April 30, 1983).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Age Differences; Auditory Perception; Comprehension; *Hearing Impairments; *Language Acquisition; *Language Processing; Language Skills; Learning Processes; Stimuli; *Syntax; *Television

ABSTRACT

The paper examines ways in which language complexity of the stimulus and language ability of the receivers may influence learning via television for hearing impaired and hearing children. Research is reviewed on the impact of language abstraction on learning from television, and findings from paired associate learning trials are cited to suggest that young children will ignore relatively more abstract information to focus on the more concrete. Similarly, syntactic complexity in television language and high degrees of inferential material are thought to interfere with learning. Language levels of the viewers are described as related to age in terms of selective attention, increased life experiences, and improved role taking and temporal integration skills. The impact of hearing deficits on the viewer's learning is said to include reduced information from the audio track and greater difficulty in comprehending the auditory information that is received. The authors conclude with a brief description of a project examining the relationship of language variables and television learning in hearing and hearing impaired children (6-13 years old). (CL)

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ED236876

Language Level as a Mediator of Learning from Television

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EC160897

Paper presented at the annual meeting of the Eastern Communication Association, Ocean City, Maryland, April 30, 1983.

Introduction

"Language level as a mediator of learning from television". This may seem to be a fairly ambiguous title in one sense: the language level of what? Let us assure you that it is deliberately so. Over the past year or so Toni Maxon and I have begun a research project at UConn that deals with language level and its impact on learning from TV on two different fronts. A discussion of our thinking and our variables of interest is what we propose to present here.

On the one hand, we are interested in examining some of the dimensions of the linguistic complexity of television programs themselves, in terms of their implications for learning. Oddly enough, these have not been studied to any great extent in the past. These dimensions include the abstraction of the message, the syntactic complexity of the message and the amount of inferential material contained in the message, and are representative of semantic, syntactic and pragmatic aspects of language, respectively.

On the other hand, when one speaks about learning, it is learning by individual receivers who have characteristics of their own in varying degrees that mediate that learning. Here is where the other aspect of language level comes in. We are interested in examining learning by child viewers who vary in their linguistic abilities. One obvious way in which children vary in language skills is as a function of age or developmental level, with younger children being less sophisticated language users in several respects than older children. Another way in which children vary, which represents the other major dimension of interest for us, is related to their ability to hear. It has been suggested that a hearing impairment is the most devastating

of perceptual handicaps because one's ability to think, learn, and comprehend the world, as well as communicate with others, is so bound up with one's ability to hear language. Therefore, an impairment in this single sensory mode can produce not only social isolation but significant cognitively-based deficits as well.

Let us now proceed to discuss each of these separate issues in some detail.

Linguistic complexity of the stimulus.

Abstraction. The impact of language abstraction on learning from television has received relatively little research attention to date (Welch and Watt, 1982) but ought to be a fairly critical impediment to learning of televised messages by children under the age of twelve, for the following reasons. According to Piaget (Flavell, 1963; Wackman and Wartella, 1977), children approximately between the ages of two and seven are extensive language users, but their cognitive activities tend to be strongly tied to perceptual reality. Symbolic manipulation beyond the scope of their perceptual experiences, such as those involving abstract concepts, are also beyond their cognitive abilities. Similarly, Bruner (1964) has described the thinking of children in this age group as involving predominantly iconic modes of representation. Presumably, cognitive processing at this age would depend on information that can be conveyed in imagery form.

According to the Piagetian theoretical scheme, children between approximately the ages of seven and twelve still understand the world in terms of concrete events. It is not until the age of twelve or so that children truly think in abstract terms and independently of their

perceptions.

The effects of abstraction have been studied extensively with paired-associate learning tasks (cf., Paivio and Yuille, 1966; Rohwer, 1970). Words for which the referents are abstract concepts, such as truth or justice, are consistently more difficult to learn than words for which the referents are concrete objects, such as chair or newspaper. These results hold up across children of all ages as well as adults. But given the cognitive constraints operating on younger children, we would expect that these results would be more pronounced than with older children or adults.

To try and extrapolate these findings to the television viewing situation may be difficult, but a little consideration of the stimulus presentation situation in each case suggests that abstraction may be even more of an impediment in television learning. Paired-associate learning trials typically follow controlled experimental procedures. Subject attention is focused on the stimuli, by removing irrelevant and distracting competing sources of attention. The experimental stimuli themselves are simple, static line drawings or words. Television viewing is considerably more complex. Central information is woven together over time with a considerable amount of simultaneously presented competing information, some related and some not, through both audio and visual channels. Furthermore, typically, the viewers are not cued to attend with the purpose of learning as they must be in the experimental situation. One conclusion is that if abstraction is an impediment to learning at all, then it should certainly be so for the complex perceptual tasks involved in learning from television.

Welch and Watt (1982) studied the learning impact of language abstraction in a televised message among preschool-aged viewers of "Sesame Street" and "Misteroger's Neighborhood". Abstraction was measured by an index of judges' ratings of nouns taken from the program transcripts. One set of ratings asked judges to indicate those nouns for which the referents could be observed. The other set asked judges to evaluate the extent of abstraction of a noun on a five point scale, using their own criteria. They found that abstraction did indeed impede verbal recall of program content but did not impede recognition of material that had been presented on the visual track (which inevitably involved concrete referents that could be depicted visually). This last finding is supported by Hayes and Birnbaum (1980) who reported that when preschool-aged viewers were presented with simultaneous unrelated messages via audio and visual channels, they tended to ignore the audio information and attend solely to the visual. To place these results back in the present context, if young children are presented with relatively more abstract information via one channel and concrete information via another, they will tend to ignore the first and attend to and learn in varying degrees the latter.

Syntactic complexity.

The learning impact of the structural or syntactic complexity in television programming has received no research attention to date, to our knowledge. The syntactic complexity of language has received considerable attention from psycholinguists, however, who traditionally have examined it from a developmental perspective (reviewed in Kretschmer and Kretschmer, 1978). Other investigators

have developed scales with which to assess the syntactic complexity of a child's language (Wurtzel, Roth and Cairns, 1974). Lee (1974) described a sequence of syntactic forms in terms of eight developmentally scaled categories: indefinite pronouns (e.g., it, this, that), personal pronouns, main verbs, secondary verbs (e.g., to plus verb), negatives, conjunctions, interrogative reversals (e.g., were they?), and wh- questions (e.g., who, what). With these categories, she has developed a method for assessing the syntactic complexity of the language a child uses. The higher up in the developmental sequence the language used, the more complex it is considered. For example, the use of the personal pronoun "one" is more complex than "me".

We suspect that the perceptually complex nature of television programming warrants the use of fairly simple syntactic forms to ensure learning, even among children who may use complex forms in their own language activities. For children who have not yet attained an understanding of complex forms, simple syntactic structures in programming are even more clearly warranted. In terms of our research expectations, we tentatively expect that syntactic complexity in television programming will vary inversely with learning from that programming.

Amount of Inferential Material. As adults who try to make meanings out of written or spoken phrases, we go beyond the literal meanings of the words and of the syntactic structure. We also organize and expand these literal meanings and fill in the blanks, so to speak, with information that has not been explicitly provided. To the extent that we do not do this, our comprehension of a narrative is

extremely limited. The ability of children to make these inferences is not well understood, although Collins (1970), Collins, Berndt and Hess (1974) and Collins, et al. (1978) document age-related differences in activities related to inference-making from television programs.

Let us first describe what we mean by inferential material and then speculate a bit on its learning effects. There are a number of ways to define the concept. We started out with two basic ideas. First, inferential material is any information, important or unimportant, that is implied in a narrative but not explicitly stated. Second, inferential material represents the overall purpose or meaning of the narrative, beyond the specific events that occur.

It turns out that several more specific categories of inferences have already been provided by earlier researchers. Decker, et al. (1980) describe a useful four category system consisting of the following: word, syntactic, contextual and thematic. Word inference refers to ambiguities in word meanings whereby individual words or word groups may have multiple meanings. We must infer the appropriate meaning of the word or word group to fit the context. Syntactic inference refers to inferences that are made on the basis of the syntactical structure. For example, one must infer the referents for pronouns. Contextual inference refers to the elaboration of meaning beyond what is provided. Finally, thematic inference refers to the ability to understand the general narrative in terms of its structure, organization and purpose. According to Decker, et al., "The ability to recognize discourse structure is crucial in deciding what is important information and how it is relevant" (p. 61). These last two

categories most closely resemble our ideas about inferential material.

What kind of an impact will this material have on learning? Since inferential material is based on explicit information, it represents a kind of higher order knowledge. Collins, et al., (1978) obtained evidence that children who remembered the explicit premises on which inferences were based were more likely to make the correct inferences. This suggests that inferential material should be more difficult for children to understand, insofar as comprehension is contingent on (a) understanding and remembering one or more explicit premises, and (b) doing something with this knowledge - organizing it, integrating it with other material, elaborating on it, or whatever. In addition, however, there may be cognitive constraints operating on children that preclude the ability to make inferences prior to a certain level of cogitive development. More will be said about this in the next section.

Language level of the receivers

Age-related differences in language ability. In the previous section, we grouped together all children under the age of twelve as if they were cognitively similar in terms of their responses to various language attributes, in order to focus our attention on the stimuli of interest.

Now, let us examine some of the cognitive changes that occur between the preschool years and early adolescence that may mediate the impact of the stimulus variables. Some of the following discussion is a reconceptualization of material available in Wackman and Wartella (1977).

There are three relevant areas of cognitive changes that occur during these childhood years. We shall describe these areas and then discuss how they might mediate the effects of abstraction, syntactic complexity and inferential material.

First, as children increase in age they also increase in their store of life experiences (including television experiences). Completely apart from any structural changes that may occur cognitively, older children simply know more than younger children. They understand more about how the world works, they have a greater repertoire of personal experiences to draw on in attempting to understand new situations, and they increasingly have redundant or familiar experiences based on this accumulating fund of knowledge. All of this knowledge may be brought to bear on the comprehension of new situations, including television programs.

Second, as children increase in age, they increase in capacity, control and discriminability of their perceptual experiences. In terms of capacity, older children are less likely to centrate, or focus only on a single perceptual attribute but rather can attend to more attributes simultaneously. Their short term memory storage capacities also increase. In terms of control, older children are less riveted, so to speak, to dominant perceptual cues and are more able to allocate their attention to meet their own information needs. With regard to discriminability, older children are able to make increasingly fine perceptual distinctions.

Third, and finally, older children exhibit greater flexibility in making hypothetical shifts in time and space. They are less bound to their own viewpoint in the present tense. In terms of the time

dimension, older children are more able to integrate or reconstruct discrete events in the correct temporal order, while younger children are likely to see discrete events as either unconnected or connected in some fortuitous but incorrect manner. In terms of the spatial dimension, older children show greater role-taking ability; that is, they are more able to see the world from someone else's perspective, while younger children are more likely to be egocentric.

It is expected that the changes in each of these three areas are expected to occur linearly as a function of age.

The general picture that emerges, then, is one in which older children are increasingly able to allocate their attention selectively, which implies a knowledge about which information is central or important to the narrative. Some of this ability may be based on perceptual changes and some based on increasing life experiences. With age, children should be able increasingly to discriminate the critical features of words and to attend simultaneously to both audio and visual tracks, exhibiting less visual track dominance. They should increase in ability to integrate program events temporally, which is essential to an understanding of the narrative form, the content, and the relationships among motives, deeds and consequences. Their increasing role-taking ability is also essential to a comprehension of motives and should result in an increasing ability to make judgments of people based on inferences about their motives, rather than being limited to observable behaviors in making such judgments.

The specific implications are that, with increasing age, inferential material should present less and less of a learning

problem for children. Similarly, syntactic complexity should pose less of a problem, as children become more adept at processing a greater variety of inputs simultaneously. There is no clear indication, however, that abstraction should be less of a problem for older children in our age group than for younger children, except insofar as their increasing store of life experiences may allow them to increasingly generalize their knowledge beyond specific circumstances. These descriptions, of course, are based on non-impaired, normally developing children. A sensory deficit is quite likely to result in differences in level of linguistic ability as it relates to age.

Differences in hearing ability. In this section, we will discuss the particular characteristics of hearing impaired children in terms of their language abilities and the implications for learning from televison.

Initially, it may appear that concern with the learning potential of television for hearing impaired children may be misplaced given their limited ability to access the auditory information effectively. However, ironically perhaps, it seems that hearing impaired children spend more time watching televison than do their hearing peers (Seidelbaugh, 1978; Liss and Price, 1981). Television, therefore, plays a particularly prominent role in the lives of the hearing impaired.

For the sake of conceptual simplicity, our discussion will consider hearing impaired children as a single group. In reality, however, hearing impairment represents a continuum extending from mild hearing loss in one ear to profound bilateral hearing loss.

Intersecting this continuum is another important dimension, the age of onset of the hearing loss. The most severe hearing loss-associated handicaps affect children who have congenital or pre-lingual profound hearing losses. For children whose hearing disorders post date their acquisition of language, the degree to which this discussion applies is reduced.

The following quotation, taken from the preface from Readable English for Hearing-Impaired Students (Decker, et al., 1980) vividly describes the language impoverishment of the hearing impaired child: "Hearing children grow up immersed in a world of sound and language. They learn to communicate verbally without conscious effort through constant exposure to speech. From the time of their birth, they overhear conversations, watch television, listen to the radio and records, and continually relate to parents, siblings and playmates through language. By the time these children enter kindergarten, they already have well-developed vocabularies and almost total mastery of syntactic structures . . . In dramatic contrast, most prelingually deaf children are deprived of even the most common and basic natural language experiences" (p. v).

In fact, it has been estimated that the average normal hearing child enters kindergarten with a vocabulary repertoire of 3000 to 5000 words. The hearing impaired child's repertroire is significantly reduced with the more impaired (deaf) knowing as few as 25 or 50 words (Decker, et al., p. 1). Moreover, the gap between the two groups typically continues to widen over the years rather than diminish. In a study of 165 hearing impaired children between the ages of five and seventeen who are mainstreamed in Connecticut public schools, the

following statistics were collected. In terms of orally presented receptive vocabulary (measured by the Peabody Picture Vocabulary Test), the average hearing impaired child scored at 3.3 years below chronological age, with only two out of 165 subjects scoring at or above chronological age. In terms of syntactical knowledge, most of the subjects had at least basic knowledge of language structures, such as that of the average hearing first grader.

In order to assess their receptive speech discrimination, the researchers asked the subjects to repeat single words communicated by an adult tester in each of the following three conditons: auditory only, in which the subjects could not read lips but had to rely solely on listening with hearing aids; visual only, in which the hearing aids were turned off and the subjects read the tester's lips; and auditory and visual, in which the subjects utilized both auitory and observational cues. In the auditory condition, the children correctly repeated an average of 58% of the words. In the visual, they repeated 44%, and, in the combined, they repeated 86% (Maxon and Brackett, 1983). Normal hearing children typically correctly repeat 88-100% of the words. Therefore, under optimal conditions, in which the hearing impaired subjects have access to all possible information about single words, their performance comes close to that of hearing subjects. Why then is their typical language performance so much lower than that of hearing children? For three reasons: (1) optimal receiving conditions do not typically obtain in the real world. Other sounds interfere and the observation of lip and other nonverbal cues may be obstructed. This would certainly be the case in the typical television viewing situation. (2) Most information processing tasks,

including those involved in learning from television, require more complex responses than the repetition of single words. (3) As a result of their formative experiences deprived of language, hearing impaired children have language deficits that transcend their ability to discriminate particular sounds.

In summary, if we assume that the information conveyed on the audio track of the average television program is both extensive in quantity and complex in semantic and structural quality, then the hearing-impaired receiver has a dual problem relative to hearing receivers: first, the hearing-impaired viewer will not receive all of the audio information. Even with hearing aids on, the information received will be reduced in intensity and frequency range. Second, since the hearing-impaired viewer has reduced language abilities, the auditory information, which is for the most part verbal in nature, will be more difficult for her to comprehend. The hearing-impaired viewer receives a distorted, reduced audio signal and must process it with a reduced linguistic system. Consequently, all of the language based television attributes of interest here should pose particular problems for this audience segment.

Conclusion

We have presented an overview of some of the ways in which language complexity of the stimulus and language ability of the receivers may influence learning from television by child viewers. Much of this discussion has been theoretical and, in some cases, speculative, because relatively little empirical evidence exists at this point concerning these relationships. The obvious next step,

then, would be to attempt to document the expected relationships via empirical investigation. We are presently engaged in just such an effort. At this point, we have interviewed approximately 100 hearing children between the ages of six and thirteen, after having exposed them to two television programs produced expressly for children (an ABC After School Special and a 3-2-1 Contact). We have asked them specific recall questions concerning both explicit and inferential content. In addition, we have asked them to describe what they believe to be the purpose or meaning of the narrative. We are now engaged in replicating this task with hearing-impaired youngsters in the same age range. When all of this data is accumulated, we will examine the relationships of all of the language variables described here both within and across age and hearing ability groups.

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